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Region-Specific Communication Strategies for the Diffusion of Studless Tires in Hokkaido

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The present paper is a sequel to a former study (1994) in which Yamaguchi discussed the success and failure of the communication strategies that the change agents (the Hokkaido government) had taken for diffusion of studless tires in Hokkaido and tested some assumptions extracted from the discussion, analyzing the data of the survey he conducted. The study started with the following research questions (p. 5): 1) were appropriate information sources provided for potential adopters in each of Rogers' adoption stages (the Knowledge, the Persuasion, the Decision, and the Confirmation stages)?; 2) were the contents of the information ("Relative Advantage," "Observability" and "Trialability" information) appropriate for potential adopters (in the Decision stage)?; 3) were appropriate information sources provided for different types of adopters (Innovator, Early Adopter, Early Majority, and Late Majority) in the Persuasion stage?; and 4) are adopters satisfied with studless tire use?

As for the research question 1), the results suggested that the communication strategies were successful only in the Persuasion stage. When adopters were in the process of forming favorable or unfavorable attitudes toward

studless tires, they were provided information sources appropriate enough to be motivated to adopt studless tires. In the other stages, however, the change agents failed to provide proper information sources to potential adopters. Besides, it seems that the communication strategy followed the same pattern regardless of adoption stage. In other words, rank orders of frequencies of information sources people got in touch with were not varied according to the adoption stages they were in, and the frequency was like the following order: "Mass Media" and "Interpersonal Communication" information sources ranked first or second in the frequencies, "Advertisement" third, "Access to Information" fourth and "Experience" last in all the adoption stages other than in the Confirmation stage (Table 1–a).

Regarding research question 2), the results of the data analyses showed that the potential adopters did not receive adequate information when they tried to make a choice of either employment or rejection of studless tires (the Decision stage). Although, theoretically speaking, potential adopters of an innovation should have received more information regarding "Trialability" than any kinds of information, the adopters of studless tires in Hokkaido were provided with much more "Relative Advantage" information than "Trialability" information even in this stage. This was also assumed to be one of the reasons it took much time the change agents to diffuse studless tire use in Hokkaido (Table 1–b).

Next, Yamaguchi conducted a survey on the transfer of information sources appropriate according to various types of potential adopters in the stage where they were in the process of shaping and developing their attitudes toward studless tires (the Persuasion stage). Only "Early Majority" adopters were able to make contact with appropriate information sources like the following rank order relations: Interpersonal > Mass Media > Adver-

Table 1. Results of the Former Study

a) The Mean Ranks of Information Sources in Four Decision Stages

	Knowledge	Persuasion	Decision	Confirmation
Mass Mecia	2.04(1)	2.21(2)	2.49(2)	2.62(3)
Interpersonal Com.	2.38(2)	2.18(1)	2.26(1)	1.96(1)
Advertisement	2.79(3)	2.83(3)	2.53(3)	2.60(2)
Access to Infor.	3.74(4)	3.80(4)	3.74(4)	3.78(4)
Experience	4.05(5)	3.99(5)	3.98(5)	4.04(5)
	$\chi^2=107.1$	$\chi^2=104.8$	$\chi^2=89.7$	$\chi^2=109.6$
	$p<.01$	$p<.01$	$p<.01$	$p<.01$
	df=4	df=4	df=4	df=4
	n=89	n=89	n=89	n=89

b) The Numbers of Respondents Who Received Three Information in the Decision Stage

	Receved	Not received
Relative Advantage	71	18
Observability	20	69
Trialability	15	74
	Cochran Q=90.03 $p<.01$ df=2 n=89	

c) The Mean Ranks of Information Sources of Four Different Types of Adopters Contaced in the Persuasion Stage

	Innovator	Early Adopter	Early Majority	Late Majority
Mass Media	2.44(1)	2.77(1)	2.27(2)	1.69(1)
Interpersonal	2.69(2)	3.46(5)	2.05(1)	1.88(2)
Advertisement	3.00(3)	2.85(2)	2.94(3)	2.73(3)
Access to Infor.	3.31(4)	3.00(4)	3.77(4)	4.21(4)
Experience	3.56(5)	2.92(3)	3.97(5)	4.48(5)
	$\chi^2=2.65$	$\chi^2=1.54$	$\chi^2=36.86$	$\chi^2=69.55$
	n.s.	n.s.	$p<.01$	$p<.01$
	df=4	df=4	df=4	df=4
	n=8	n=13	n=31	n=26

d) Satisfaction or Dissatisfaction with Studless Tire Use & Studless Tire Use or Spiked Tire Use

Satisfaction	Dissatisfaction	Studless Tires	Spiked Tires
15	33	24	65
n=48 Test=.5 Obs.=.3125 p<.05		n=89 Test=.5 Obs.=.2697 p<.01	

Source: Yamaguchi, I, "Communication Strategies for Diffusion of 'Studless Tires' in Hokkaido: An Empirical Study" in *Meiji University Kyoyo Ronshu, vol. 273, pp. 1–24*, December 1994.

tisement>Access to Information>Experience. Late Majority adopters should have had access to more "Interpersonal Communication" information sources than other sources, but they received more information through a "Mass Media" information source than an "Interpersonal Communication" information source. "Innovator" and "Early Adopter" groups were not provided appropriate information sources in the Persuasion stage. They did not use those information sources to any different degree (Table 1–c).

Lastly, Yamaguchi analyzed the data to determine if there were significant differences between adopters' satisfaction and dissatisfaction with studless tire use and also between their desires for studless and spiked tire use without the intervention of the law. As expected, there were many more people who were not satisfied with studless tires than those who were satisfied with them, and there were also more people who wanted to use spiked tires than those who liked to use studless tires without the intervention of the law (Table 1–d).

The above results implied that the change agents did not succeed in utilizing and manipulating appropriate communication strategies in a proper manner to diffuse studless tires in Hokkaido. Yamaguchi concluded that the in-

effective communication strategies retarded the diffusion of studless tires and lead to compulsory execution of restriction on spiked tire use.

However, Yamaguchi failed to take into consideration communication strategies by area. Hokkaido island is even bigger than Kyushu island though it is one prefecture unlike Kyushu island which is divided into seven prefectures. It is so spacious that temperature and the amount of snowfall are very different in the north, south, east and west. It means that a necessary condition and a requirement for spiked tire use are diverse among those areas and hence communication strategies for diffusion of studless tires peculiar to various areas are required. Indeed, in winter 1992 when the maximum rate of spiked tire use went down to 25.4% in Sapporo, Asahikawa's was still 58.7%, Hakodate's 61.6%, Kushiro's 65.5%, Kitami's 64.6%, Obihiro's 50.6%, Muroran's 51.9%, Otaru's 60.8% and Iwamizawa's 46.7% (Yamaguchi, 1993, 1994) as shown in Table 2. Therefore, we cannot determine if the communication strategies failed until we examine whether the change agents took appropriate strategies in each area.

In the former research Yamaguchi carried out (1994), the data were collected from two distinct areas: one is the Sapporo area and the other is the Abashiri area which is located in the eastern part of Hokkaido. He did not analyze the data of the Sapporo and the Abashiri areas separately, but rather

Table 2. The Maximum Rate of Spiked Tire Use in Winter 1992

Areas	Maximum Rate	Areas	Maximum Rate
Sapporo	25.4%	Obihiro	50.5%
Asahikawa	58.7%	Muroran	51.9%
Hakodate	61.6%	Otaru	60.8%
Kushiro	65.5%	Iwamizawa	46.7%
Kitami	64.6%		

Source: *Hokkaido Newspaper*

integrated the data of both areas. Concerning only research question 3) mentioned above, the data were analyzed appropriately because the subjects were categorized into five types, following Rogers' theory (1983) and according to the period they adopted studless tires, which were set up differently peculiar to each area. Therefore, in the present study we will examine if the change agents used region-different communication strategies effectively regarding the research questions 1), 2) and 4) presented in the former study. The following research questions will be thrashed out in the present study:

1) Were appropriate information sources provided for potential adopters living in different areas (the Sapporo area and the Abashiri area) in each of Rogers' adoption stages?
2) Were the contents of the information appropriate to potential adopters living in different areas (the Sapporo area and the Abashiri area) when they were in the Decision stage?
3) Were adopters living in different areas (the Sapporo area and the Abashiri area) satisfied with studless tire use to the same degree?

1 A Model of a Structure for Successful Communication Strategies for Diffusion of Studless Tires

Welden and Heinberg (1985) suggest that an action never comes from a random program. They state that perception of necessity and the desire to adopt an innovation, such as the new tire, can be developed only when the structure of the social action program is well constructed. Therefore, a model for a social action program proper to diffusion of studless tires in differ-

ent areas will be built in this section. Then, the model can be a frame for making hypotheses to test if the change agents took proper communication strategies by area.

The structure for this study involves three dimensions, and each dimension comprises several cells. An action program for the diffusion of studless tires can be made by combining cells of those three dimensions illustrated in Figure 1: information sources; contents of information; and characteristics of areas.

(1) Information Sources

As presented in the former study (1994), there are five information sources: Mass Media, Interpersonal Communication, Advertisement, Access to Information, and Experiences. Each of the information sources explained in the former paper (p. 6) is summarized here.

Mass Media are information sources such as newspaper, TV, and radio.

Interpersonal Communication refers to exchanges of information with other

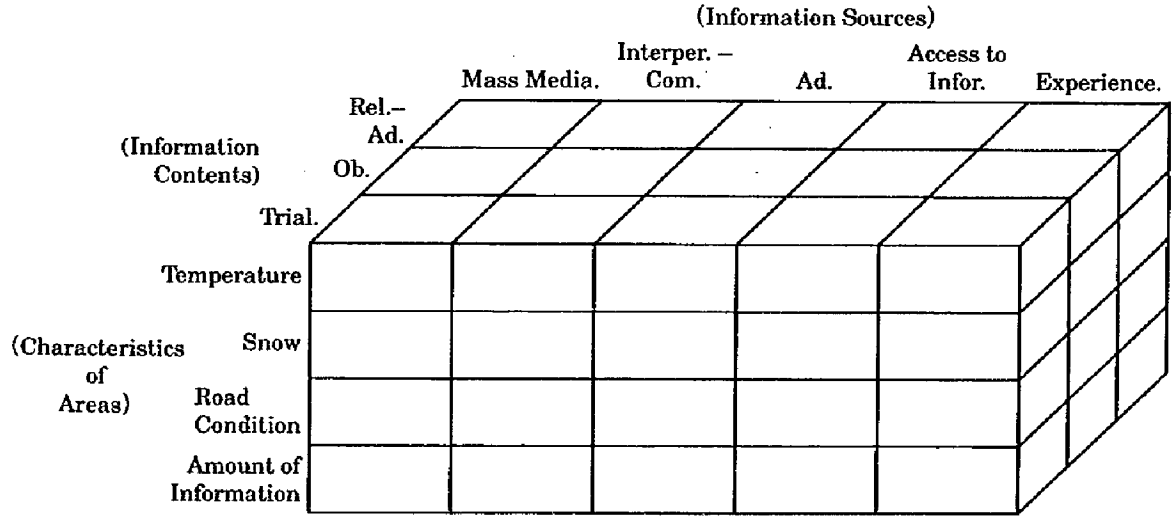

Figure 1. A Structure of a Social Action Program for Diffusion of Studless Tires

persons such as friends, neighbors, family members, colleagues, and so on.

Advertisement represents information sources such as salespersons and advertisement on store fronts.

Access to Information indicates potential adopters' participation in symposia, lectures and exhibitions held by change agents to acquire information.

Experience refers to potential adopters' taking a trial ride and becoming a monitor to get information.

(2) Information Contents

There are three information contents the change agents should emphasize according to people's adoption stages as explained in the former paper (p. 9): Relative Advantage, Observability and Trialability.

Relative Advantage is information that new technology or an innovation (studless tires) has more advantage in efficiency, compared with current technology (spiked tires).

Observability is information that potential adopters are given opportunities for observing the efficiency of the studless tires.

Trialability is information that potential adopters are provided with chances for trying studless tires in person.

(3) Characteristics of Areas

This dimension was not presented in the former study because regional differences in communication strategies were not examined there. The dimension has four cells indicating specific conditions which can influence people's motivation to adopt studless tires: temperature, snow, road condition & repair and amount of information.

Temperature affects frozen precipitation on roads, which is a crucial factor

for employing or rejecting studless tires because it is clear that studless tires are weaker in braking on icy roads than spiked tires. The Abashiri area is much colder than the Sapporo area.

Snow includes a concept about the time of snowfall and whether the melting snow is earlier or later and whether the amount of snowfall is light or heavy. There is a big difference in those aspects between the Sapporo area and the Abashiri area.

Road Condition & Repair refer to a factor of whether or not roads are always in good condition appropriate for driving with studless tires during winter. The capacity for keeping roads in good condition depends on the situation of local governments–especially in the financial situation.

Amount of Information represents the numbers of opportunities potential adopters are able to obtain in person. There is assumed to be more information in urban areas than in rural areas.

2 Strategic Options of a Structure of a Social Action Program and Communication Strategies Specific to the Sapporo Area and the Abashiri Area

Depending on strategic options that change agents make from a structure of a social action program (Figure 1), a proper communication strategy can be determined. In this study, however, characteristics of areas are the most important determining factor for working out communication strategies. In this section, therefore, on the basis of the "characteristics of areas" dimension, we will discuss communication strategies that the change agents should take or should have taken. Based on the discussion, some hypotheses will be made for examining the research questions of this study mentioned earlier.

2.1 Appropriate Information Sources Specific to Each Area in Rogers' Adoption Stages

(1) Knowledge Stage

According to Rogers (1983) and Uno (1990), potential adopters in this stage need to acquire perceptual, how-to and principal knowledge. People in this stage want to get as much information and as broad a base of information as possible. It suggests that "Mass Media" and "Access to Information" are the most important information sources which enable the change agents to send out a large amount of information. Out of those two information sources, a "Mass Media" information source seems to have nothing to do with Characteristics of Areas because TV, Radio and Publications are all available equally regardless of the size of cities and towns in Hokkaido. However, people in rural areas are assumed to be provided with fewer opportunities to reach an "Access to Information" information source than those in urban areas. Therefore, strategic options of a structure influencing regional differences in communication strategies in this stage should be an "Amount of Information–Access to Information–Observability" cell (people acquire observability information through an "Access to Information" information source). People in rural areas are assumed to have less "Observability" information through an "Access to Information" information source than those of urban areas. Therefore, the change agents should make an effort to provide enough "Access to Information" information sources for people living in the Abashiri area.

(2) Persuasion Stage

Upon obtaining knowledge of an innovation, people go on to form their attitude toward it–favorable or unfavorable (Rogers 1983, Uno 1990). There is a proposition that in this stage an "interpersonal communication" information source is most important for people to have a positive feeling toward studless tires. However, it seems that Characteristics of Areas are not related to communication strategies specific to different areas in this stage since an "Interpersonal Communication" information source does not undergo the influence of "Temperature," "Snow" and "Road Condition & Repair" and "Amount of Information." Therefore, strategic options of structure cells are not made to specify a region-specific communication strategy. In other words, the change agents don't have to manipulate these strategies according to areas.

(3) Decision Stage

People decide to employ or reject an innovation in this stage. Once potential adopters develop favorable feelings toward studless tires, they are going to the next process in which they feel like trying the tires. They may not dare to adopt new technology until they experience it. It is uncertainty about an innovation that can make people hesitate to employ it. Because people want to get rid of uncertainty about it, they need to obtain "Trialability" information through an "Experience" information source.

However, it is natural that the degree to which people feel uncertain about studless tire varies according to people in different areas since the lower the temperature of an area, the more easily and the more often roads are frozen and the slower the snow starts to melt. Of course, the Abashiri area is much

colder in winter than the Sapporo Area. Furthermore, according to the *Hokkaido* Newspaper (October 2, 1991 and November 22, 1991), local governments are not so financially stable to keep roads in good condition during winter as the Sapporo government is. Given the above factors, the change agents should extract the strategic options from structure cells to influence region-specific communication strategies like these: "Experience–Temperature/ Snow/ Road condition & repair–Trialability." Therefore, the change agents should provide more of an "Experience" information source for people in the Abashiri area than in the Sapporo Area.

(4) Confirmation Stage

People's decision of an innovation is not a goal in their adoption processes. They may discontinue using the innovation once they recognize it doesn't work well and then go back to the technology they used to utilize. Rogers (1983) called this phenomenon discontinuance. Therefore, change agents need to continue providing "after-adoption" information for adopters. Drivers in Hokkaido cannot go back to spiked tire use due to the law, but they need to receive aftercare information all the more because they cannot avoid using studless tires. Communication with persons who have a great deal of knowledge about studless tires can only help them. It is sales persons and tire makers that should play this role, and the change agents should ask them to cooperate in a social action program for the diffusion of studless tires. Thus, an "Advertisement" information source is most necessary in this stage.

"Advertisement" information sources are equal in opportunity to make contact anywhere in Hokkaido (though there are fewer sales persons and stores proportionately in smaller places), and hence they are not varied ac-

cording to areas regardless of "Temperature," "Snow," "Road Condition & Repair" and "Amount of Information." It means that strategic options of structure cells for this social action program (Figure 1) don't have to be undertaken to represent a region-specific communication strategy.

In order to test if the change agents tried to manipulate their communication strategies to adjust them to the divergent areas, we will build the following null-hypotheses:

H1–a In the Knowledge stage, there were no significant differences in order relations of contact frequencies of an "Access to Information" information source between the Sapporo area and the Abashiri area.

H1–b In the Persuasion stage, there were no significant differences in order relations of contact frequencies of an "Interpersonal communication" information source between the Sapporo area and the Abashiri area.

H1–c In the Decision stage, there were no significant differences in order relations of contact frequencies of an "Experience" information source between the Sapporo area and the Abashiri area.

H1–d In the Confirmation stage, there were no significant differences in order relations of contact frequencies of an "Advertisement" information source between the Sapporo area and the Abashiri area.

2.2 Strategies of Information Contents in the Decision Stage

As discussed in the former paper (1994, p. 9), Yamaguchi surveyed whether or not the information contents that the change agents provided for potential adopters were appropriate in the Decision stage. Because it is in this stage that people actually decide to employ or reject an innovation, a

communication strategy is the most crucial in this stage. According to Rogers (1983), "...most individuals who try an innovation then move to an adoption decision, if the innovation has at least a certain degree of relative advantage" (p. 172). The potential adopters in this stage have already had knowledge of an innovation and observed its "Relative-Advantage or Disadvantage." Therefore, Yamaguchi stated in the former paper that the change agent should emphasize "Trialability" information more than "Relative-Advantage" and "Observability."

However, "Trialability" information tends to concentrate on urban areas: people in urban area are easier to approach with "Trialability" information than those in rural areas are. People in east Hokkaido need to be provided with "Trialability" information all the more because the winter is much severer than other areas: the temperatures are lower and snow starts to melt later. Although the change agents offered a trial ride in cars with studless tires and a short course of driving them in Kitami, it takes people living in the Abashiri area about two hours to get there. Thus, the strategic option of communication strategies that the change agents should take in this stage is an "Experience-Temperature/ Snow/ Road condition & repair-Trialability" cell as mentioned earlier. The change agents should give more "Trialability" information to people in the Abashiri area than those in the Sapporo area. In order to find out whether or not the change agents provided "Trialability" information in different degrees for people in the divergent areas in the Decision stage, we will test the following null-hypothesis:

H2 There were no significant differences in the numbers of people who received "Trialability" information between in the Abashiri area and the Sapporo area.

2.3 Differences in Satisfaction with Studless Tires between Drivers in the Sapporo Area and Those in the Abashiri Area

As mentioned in the former paper, because drivers in Hokkaido were forced to stop using spiked tires, drivers had no choice and are assumed to be far from being satisfied with studless tire use. Indeed, the assumption was supported by the results of the former research. However, it is doubtful whether or not drivers living in different areas are satisfied or dissatisfied with it to the same degree because of dissimilarity in weather and road conditions.

The rate of transition to the use of studless tires shows that, compared with a fall of the rate of spiked tire use in Sapporo, that of other cities and towns was much slower. Faith in spiked tires is much stronger everywhere except in Sapporo. In 1989, only 19.9% of Hokkaido people replied that regulation on spiked tire use should be uniformly exerted all over Hokkaido, but many people hoped that the regulation would be adjusted to local conditions (*Hokkaido* Newspaper, February 14, 1989). In 1990, the Hokkaido Police Department insisted that the law should be applied only to the city of Sapporo for the reason that road conditions in other areas were not good enough to drive cars with studless tires (*Hokkaido* Newspaper, September 27, 1990). Furthermore, the results of a survey about the law the Hokkaido government carried out on 109 cities and towns in August 1991 showed that only sixty-three would be ready to accept the law and forty-six (almost 40% including Abashiri city) still hoped to avoid the regulation. The reasons that the latter presented were uneasiness about safety and improper road conditions (*Hokkaido* Newspaper, July 17, 1991). As for road repair and condition, the city of

Sapporo equipped 105 places with a "road-heating" system between 1987 and 1991, while even the town of Hiroshima next to Sapporo had had no road with a "road-heating" system (*Hokkaido* Newspaper, October 2, 1991). Even after tire makers stopped producing spiked tires in December 1990, not a few spiked tires sold in areas other than the Sapporo area in the winter of 1992 (*Hokkaido* Newspaper, March 23, 1992). Furthermore, when 104 out of 106 cities, towns and villages except for Otaru and Yubari cities were designated as areas where spiked tire use were prohibited in 1993 (*Hokkaido* Newspaper, November 18, 1993), more than 60% of drivers hoped that they would be able to use spiked tires again (*Hokkaido* Newspaper, January 20, 1994). That was the hope especially of the people living in areas other than Sapporo.

There are clearly gaps in feelings toward studless tire use between people in the Sapporo area and those in other areas due to weather and road conditions. With reference to Hokkaido drivers' response to spiked tire use presented above, we will make the following null-hypotheses for finding out whether or not people in the Sapporo and Abashiri areas were satisfied with studless tires to the same degree.

H3 There were no significant differences in numbers of people who were satisfied with studless tire use between the Sapporo area and the Abashiri area.

H4 There were no significant differences in numbers of people who wanted to use spiked tires again outside the law between the Sapporo area and the Abashiri area.

3 Methods

3.1 Data Collection

The same data collected for the former research in the summer of 1994 were analyzed for the present study. However, areas to which subjects belong are independent variables this time (the Sapporo area and the Abashiri area). As mentioned in the former paper, forty-six samples were collected from the Sapporo area with cooperation from two agents (collection rate was 65.7%), and forty-three samples from the Abashiri area were returned to the researcher with help from one agent (collection rate was 78.2%). They all did it voluntarily.

Questions in Part A of the questionnaire were ignored this time since the subjects were not categorized for the present research. Questions in Part B, asking the subjects to rank five information sources in the order of the frequencies of receiving information through them in each of the adoption stages, provided the data for testing Hypotheses 1–a to d. The data from questions in Part C, asking the subjects what kind of information they received in the Decision stage, were analyzed for testing Hypothesis 2. The data from questions in Part D, asking the subjects if they were satisfied with studless tire use and if they would stop using the tires or continue using them outside the law in winter, were available for testing Hypotheses 3 and 4.

3.2 Tests

A Friedman test and a Mann-Whitney (U) test were available for testing Hypotheses 1–a to d. The data were an ordinal scale. First, in order to find if

there were significant differences in the rank among five information sources in each adoption stage separately for the Sapporo area and the Abashiri area, a Friedman test was valid. Then, a Mann-Whitney (U) test was conducted for determining if there were significant differences in the rank of a key information source of each adoption stage between the Sapporo area and the Abashiri area.

For testing Hypotheses 2, 3 and 4, Crosstabs Analysis was carried out. The data were a nominal scale, and hence the degree of the strength of association between two categories (coefficient of association) was measured.

4 Results

4.1 Key Information Sources in Each Adoption Stage

In the Knowledge stage, the results of a Friedman test indicated that in both the Sapporo and Abashiri subjects there were significant differences in the ranks among five information sources with the following order relation: Mass Media>Interpersonal Communication>Advertisement>Access to Information>Experience (Sapporo: $\chi^2=25.18$, $n=46$, $d.f.=4$, $p<.01$; Abashiri: $\chi^2=94.79$, $n=43$, $d.f.=4$, $p<.01$). The results of a Mann-Whitney (U) test conducted for comparison of the rank of an "Access to Information" information source showed there were no significant differences between the Sapporo area and the Abashiri area though Sapporo's mean rank was a little higher than Abashiri's as shown in Table 3 ($z=-1.3749$, 2-tailed $p=.1691$). Thus, Hypothesis H1-a cannot be rejected.

In the Persuasion stage, according to the results of a Friedman test, there were significant differences in the ranks of five information sources for both

the Sapporo and Abashiri subjects. The order relations were also different. That of Sapporo was Mass Media>Interpersonal Communication>Advertisement>Access to Information>Experience ($\chi^2=26.49$, n=46, d.f.=4, $p<.01$). That of Abashiri was Interpersonal Communication>Mass Media>Advertisement>Access to Information>Experience ($\chi^2=89.73$, n=43, d.f.=4, $p<.01$). Consistent with the results of a Friedman test, the results of a Mann-Whitney (U) test (Table 3) also showed that there were significant differences in the rank of an "Interpersonal Communication" information source between the Sapporo and Abashiri subjects with a rank order of Abashiri>Sapporo. ($z=-2.2992$, 2-tailed $p<.05$). It suggests that Hypothesis 1-b was rejected.

In the Decision stage, the results of a Friedman test indicated very different order relations of five information sources between the Sapporo and Abashiri subjects, and there were also significant differences in the rank among five information sources in both. The following order relation of the

Table 3. Mean Ranks of Key Information Sources in Four Adoption Stages

	Sapporo		Abashiri			
	n	mean rank	n	mean rank	z	2-tailed p
Access to Information in the Knowledge Stage	46	41.62	43	48.62	−1.3749	.1691
Interpersonal Communication in the Persuasion Stage	46	50.82	43	38.78	−2.2992	.0215
Experience in the Decision Stage	46	44.67	43	45.35	−.1603	.8727
Advertisement in the Confirmation Stage	46	46.67	43	43.21	−.6531	.5137

Sapporo subjects came out: Advertisement>Interpersonal Communication>Mass Media>Access to Information>Experience ($\chi^2=21.13$, n=46, d.f.=4, p<.01). That of Abashiri subjects was the following: Interpersonal Communication>Mass Media>Advertisement>Access to Information>Experience ($\chi^2=82.36$, n=43, d.f.=4, p<.01). However, an "Experience" information source ranked the last in both areas, and the results of a Mann-Whitney (U) test (Table 3), which was carried out on an "Experience" information source in this stage, also showed that there were no significant differences in the rank of the source between the Sapporo and Abashiri subjects at all (z=−.1603, 2-tailed p=.8727). It implies that Hypothesis 1-c cannot be rejected.

In the Confirmation stage, the results of a Friedman test showed that the order relations of five information sources were different between the Sapporo and Abashiri subjects and there were significant differences in the rank among five information sources in each area. Sapporo's order relation was Interpersonal Communication>Advertisement>Mass Media>Access to Information>Experience ($\chi^2=24.38$, n=46, d.f.=4, p<.01). That of Abashiri was Interpersonal Communication>Mass Media>Advertisement>Access to Information>Experience ($\chi^2=100.92$, n=43, d.f.=4, p<.01). As shown in Table 3, however, there is no mark to indicate differences in the rank of an "Advertisement" information source between the Sapporo and Abashiri subjects: the results of a Mann-Whitney (U) test showed that there were no significant differences between them at all (z=−.6531, 2-tailed p=.5131). Therefore, Hypothesis 1-d cannot be rejected.

4.2 Information Contents and Areas in the Decision Stage

As the cross table (Table 4) shows the value of Chi-square was only significant with the level of p=.066 (χ^2=3.3856, d.f.=1), and Phi (ϕ) value was .19504 (p=.066). Therefore, it cannot be said that there is enough association between areas (Sapporo and Abashiri) and numbers of subjects who received "Trialability" information in the Decision stage, or those two categories are independent of each other. Furthermore, the Lambda (symmetric) value was .06897. The low Lambda value indicates that the values of the dependent variables (numbers of subjects who received "Trialability" information) can be hardly predicted from those of the independent variables (Areas). Therefore, Hypothesis 2 cannot be rejected.

Table 4. A Cross Table of "Trialability" Information Receivers and Areas in the Decision stage

	Sapporo	Abashiri		
Not Accepted	35	39	74 83.1%	χ^2=3.3856 d.f.=1 p=.066 Phi (ϕ)=.19504 p=.066 Lambda=.06897 (symmetric)
Accepted	11	4	15 16.9%	
	46 51.7%	43 48.3%	89 100%	

4.3 Satisfaction with Studless Tires and Areas

The results of a crosstabs analysis between Satisfaction with Studless tires and Areas (Sapporo and Abashiri) showed that there was some association between them (Table 5). The Chi-square value was 3.94776 (d.f.=1), significant at the level of p<.05 and the Phi (ϕ) value was .28678, significant at

Table 5. A Cross Table of Satisfaction or Dissatisfaction with Studless Tires and Areas

	Sapporo	Abashiri		
Satisfied	11	4	15 31.3%	$\chi^2=3.94776$ d.f.=1 $p<.05$ Phi (ϕ)=.28678 $p<.05$ Lambda=.13158 (symmetric)
Dissatisfied	14	19	33 68.8%	
	25 52.1%	23 47.9%	48 100%	

the level of $p<.05$. Therefore, although the Lambda value (symmetric) was low (Lambda=.13158), Hypothesis 3 was rejected.

4.4 Studless Tire Use or Spiked Tire Use

Table 6 shows that there was some association between studless tire use or spiked tire use and Areas. The Chi-square value was 9.93838 (d.f=1), significant at the level of $p<.01$. The Phi (ϕ) value was .33417, significant at the level of $p<.01$, indicating some association between those two variables. Therefore, Hypothesis 4 was rejected although the Lambda value was low (Lambda=.16418).

Table 6. A Cross Table of Studless Tire Use or Spiked Tires Use and Areas

	Sapporo	Abashiri		
Studless tire use	19	5	24 27.0%	$\chi^2=9.93838$ d.f.=1 $p<.01$ Phi (ϕ)=.33417 $p<.01$ Lambda=.16418 (symmetric)
Spiked tire use	27	38	65 73.0%	
	46 51.7%	43 48.3%	89 100%	

5 Discussion

The strategic option from a structure for an appropriate region-specific communication strategy in the Knowledge stage was assumed to be an "Amount of Information–Access to Information–Observability" cell. Following the option, the change agents should emphasize an "Access to Information" source more to Abashiri subjects than to Sapporo ones. However, because Hypothesis 1–a could not be rejected, it can be said that potential adopters of the Abashiri area were provided with the information source to the same degree as those of Sapporo, contrary to the assumption of a communication strategy that the change agents should take. On top of that, the order direction was not as expected either, for the information source ranked fourth by subjects of both areas. Even if the difference was not significant between those two areas, the rank should have been higher in both areas (at least the second to a "Mass Media" information source). Thus, the change agents didn't utilize information sources effectively in both areas as well as in the region-specific situation in the Knowledge stage.

In the Persuasion stage, it was assumed that there would be no region-specific strategic option. In other words, the change agents should take the same communication strategies concerning information sources in both the Sapporo area and the Abashiri area. However, the null-hypothesis (Hypothesis 1–b) was rejected, and that there were big differences in the strategy. The Abashiri subjects were provided with more "Interpersonal Communication" information than the Sapporo subjects. As mentioned earlier, an "Interpersonal Communication" information source should be most crucial in this stage, but the result concerning the Sapporo subjects was not in accordance

with the assumption (though that concerning the Abashiri subjects agreed with it). Therefore, the findings suggest that the change agents should have emphasized an "Interpersonal Communication" information source more in the Sapporo area than they did.

In the Decision stage, an "Experience–Temperature/ Snow/ Road condition & repair–Trialability" cell was assumed to be chosen for a region-specific communication strategy by the change agents. Although the rank-order relations were divergent between those two areas in "Mass Media," "Interpersonal Communication" and "Advertisement" information sources, those in "Access to Information" and "Experience" information sources were not region-specific at all. In fact, because the null-hypothesis (Hypothesis 1–c) could not be rejected, an "Experience" information source was not operative under specific conditions in different areas. Moreover, an "Experience" information source ranked last in both areas although it should have ranked higher in this stage.

Since hypothesis 2 concerning information contents appropriate for this stage ("Trialability") could not be rejected, it can be also said that "Trialability" information was received to the same degree by both the Abashiri subjects and the Sapporo subjects contrary to our assumption. Thus, the change agents failed to utilize a communication strategy appropriate to different areas in the Decision stage.

The failure in a communication strategy in this stage may be a determinant for retarding diffusion of studless tires in Hokkaido and making drivers hesitate to adopt them. In fact, this stage was most crucial for this social action program, because drivers knew they had to adopt studless tires sooner or later and could not stop the use once they adopted them. They could only put off adopting them.

In the Confirmation stage, it was assumed that the change agents did not have to manipulate communication strategies according to different areas even though an "Advertisement" information source was thought to be most important. Indeed, the null-hypothesis (Hypothesis 1–d) could not be rejected, and both the Sapporo and Abashiri subjects had contact with it to the same degree as expected. However, it seems that the change agents manipulated information sources a little when applying them to each area as seen in the fact that the rank of the information source was second in Sapporo and third in Abashiri. The change agents might rely on information flow from person to person too much (an "Interpersonal Communication" information source ranked first in both areas). They should have asked sales persons, tire makers and other experts to cooperate more in providing drivers with information and advice. They should have also provided drivers with "after-adoption" information more actively than they did because adopters can never revert from the studless tire use.

Thus, characteristics of each area are clearly reflected in the order relation among five information sources. An "Interpersonal Communication" information source was very important in the Abashiri area for it ranked first in three stages and second in the Knowledge stage, while the Sapporo subjects placed it in the top rank only in the Confirmation stage. There are two possible reasons for this. One of them is the difference in socio-cultural dispositions between the Sapporo and Abashiri people. People in the Abashiri area seem to be more group-oriented than those of the Sapporo area while the latter are more individualistic. Originally the Japanese were collectivism-oriented, but as capitalism was promoted and the incidence of nuclear families increased, the people were oriented toward individualism. The Sapporo area has been developing capitalism faster and more broadly than the Abashiri

area and at the same time economical situations such as the rise in prices in urban areas has also been severe enough to cause an increase in the number of nuclear families in general. Therefore, human relationships among people may be much weaker in the Sapporo area than in the Abashiri area. However, the above theory is contradictory to the proposition of diffusion of an innovation, which says that the more homogeneous the relationships that people have in a society, the more quickly an innovation is diffused. As mentioned above, diffusion of studless tires were quicker in Sapporo than in other cities and towns in Hokkaido.

Another possible reason is that people in rural areas cannot but rely on "Interpersonal Communication" and "Mass Media" information sources since information sources other than those are not as easily available in rural areas as in urban areas. Indeed, opportunities for experiencing trial rides with studless tires and short courses in driving cars with the tires were only provided to people living in main cities.

Those limited available information sources are assumed to lead to the differences in satisfaction with studless tire use between Sapporo people and Abashiri people. In fact, Hypotheses 3 and 4 were rejected. Abashiri people were much less satisfied with studless tire use and wanted to use spiked tires again outside the law to a greater degree than Sapporo people.

These findings suggest that the change agents should have developed more "Access to Information" and "Experience" information sources than they did in all the adoption stages especially in the Abashiri area.

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